YAESU

FT-950

CAT Operation

Reference Book

VERTEX STANDARD CO., LTD.

CAT (Computer Aided Transceiver) Operation

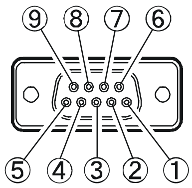
Overview

The CAT (Computer Aided Transceiver) System in the **FT-950** transceiver provides control of frequency, VFO, memory, and other settings such as dual-channel memories and diversity reception using an external personal computer. This allows multiple control operations to be fully automated as single mouse clicks or keystroke operations on the computer keyboard.

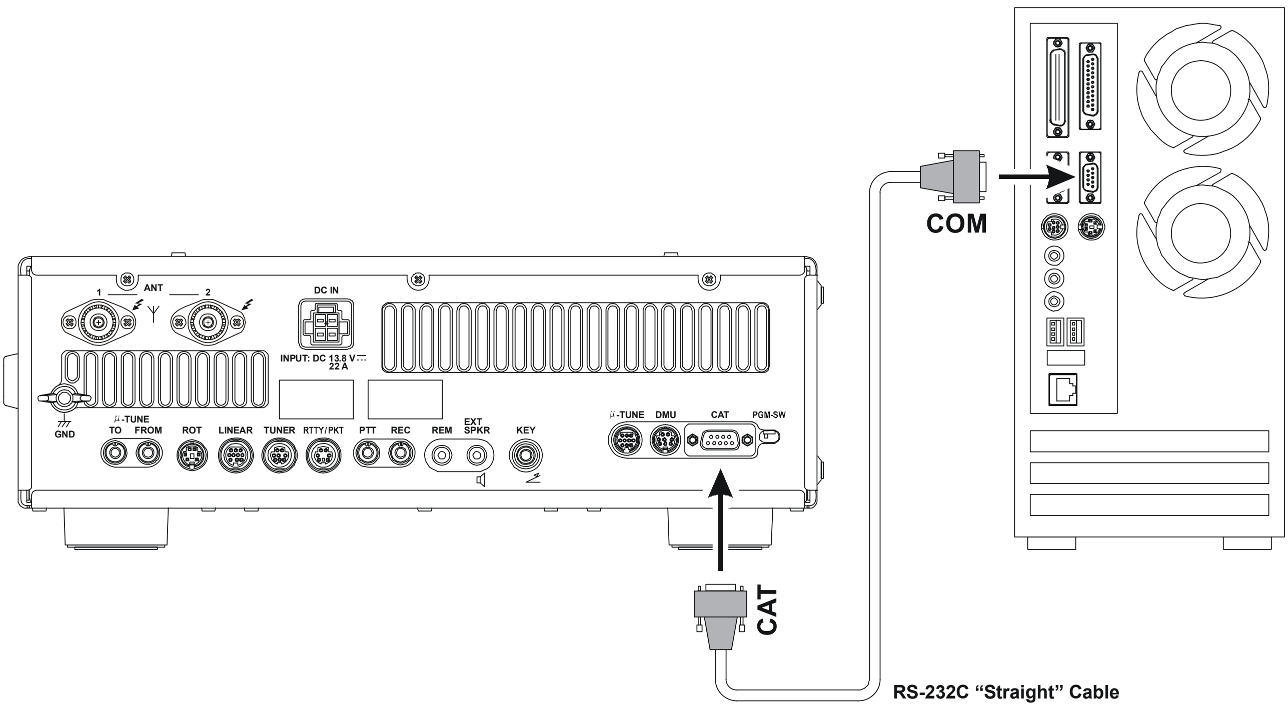
The **FT-950** transceiver has a built-in level converter, allowing direct connection from the rear-panel **CAT** jack to the serial port of your computer without the need of any external boxes. You will need a serial cable for connection to the RS-232C (serial or COM port) connector on your computer. Purchase a ***standard serial cable*** (not the so-called "null modem" type), ensuring it has the correct gender and number of pins (some serial COM port connectors use a 9-pin rather than 25-pin configuration). If your computer uses a custom connector, you may have to construct the cable. In this case, refer to the technical documentation supplied with your computer for correct data connection.

Vertex Standard does not produce CAT System operating software due to the wide variety of personal computers and operating systems in use today. However, the information provided in this chapter explains the serial data structure and opcodes used by the CAT system. This information, along with the short programming examples, is intended to help you start writing programs on your own. As you become more familiar with CAT operation, you can customize programs later on for your operating needs and discover the true operating potential of this system.

CAT Jack



Pin No.	Pin Name	I/O	Function
①	N/A	–	–
②	SERIAL OUT	Output	Outputs the Serial Data from the transceiver to the computer.
③	SERIAL IN	Input	Inputs the Serial Data from the computer to the transceiver.
④	N/A	–	–
⑤	GND	–	Signal Ground
⑥	N/A	–	–
⑦	RTS	Input	When the computer is not ready to receive data, this port goes to "L" for inhibit the transmit data from the transceiver.
⑧	CTS	Output	When the transceiver is not ready to receive data, this port goes to "L" for inhibit the transmit data from the computer.
⑨	N/A	–	–



Control Command

A computer control command is composed of an alphabetical command, various parameters, and the terminator that signals the end of the control command.

Example: Set the VFO-A frequency to 14.250000 MHz.

FA	**14250000**	**;**
↑	↑	↑
Command	Parameter	Terminator

There is three for the **FT-950** Command as shown below:

Set command: Set a particular condition (to the **FT-950**)
Read command: Reads an answer (from the **FT-950**)
Answer command: Transmits a condition (from the **FT-950**)

For example, note the following in the case of the FA command (Set the VFO-A frequency):

- ❒ To set the VFO-A frequency to 14.250000 MHz, the following command is sent from the computer to the transceiver:
  "**FA14250000;**" (Set command)
- ❒ To read the VFO-A frequency, the following command is sent from the computer to the transceiver:
  "**FA;**" (Read command)
- ❒ When the Read command above has been sent, the following command is returned to the computer:
  "**FA14250000;**" (Answer command)

Alphabetical Commands

A command consists of 2 alphabetical characters.

You may use either lower or upper case characters. The commands available for this transceiver are listed in the "PC Control Command Tables" on the following pages.

Parameters

Parameters are used to specify information necessary to implement the desired command.

The parameters to be used for each command are predetermined. The number of digits assigned to each parameter is also predetermined. Refer to the "Control Command List" and the "Control Command Tables" to configure the appropriate parameters.

When configuring parameters, be careful not to make the following mistakes.

For example, when correct parameter is "**IS0+1000**" (IF SHIFT):

IS01000;
Not enough parameters specified (No direction (+) given for the IF shift)

IS0+100;
Not enough digits (Only three frequency digits given)

IS0_+_1000;
Unnecessary characters between parameters

IS0+10000;
Too many digits (Five frequency digits given)

Note: If a particular parameter is not applicable to the **FT-950**, the parameter digits should be filled using any character except the ASCII control codes (00 to 1Fh) and the terminator (**;**).

Terminator

To signal the end of a command, it is necessary to use a semicolon (**;**). The digit where this special character must appear differs depending on the command used.

Control Command List

Command	Function	Set	Read	Ans.	AI	Command	Function	Set	Read	Ans.	AI
AB	VFO-A TO VFO-B	O	X	X	X	**MS**	METER SW	O	O	O	O
AC	ANTENNA TUNER CONTROL	O	O	O	O	**MW**	MEMORY WRITE	O	X	X	X
AG	AF GAIN	O	O	O	O	**MX**	MOX SET	O	O	O	O
AI	AUTO INFORMATION	O	O	O	X	**NA**	NARROW	O	O	O	O
AM	VFO-A TO MEMORY CHANNEL	O	X	X	X	**NB**	NOISE BLANKER	O	O	O	O
AN	ANTENNA NUMBER	O	O	O	O	**NL**	NOISE BLANKER LEVEL	O	O	O	O
BC	AUTO NOTCH	O	O	O	O	**NR**	NOISE REDUCTION	O	O	O	O
BD	BAND DOWN	O	X	X	X	**OI**	OPPOSITE BAND INFORMATION	X	O	O	X
BI	BREAK-IN	O	O	O	O	**OS**	OFFSET (REPEATER SHIFT)	O	O	O	O
BP	MANUAL NOTCH	O	O	O	O	**PA**	PRE-AMP (IPO)	O	O	O	O
BS	BAND SELECT	O	X	X	X	**PB**	PLAY BACK	O	O	O	X
BU	BAND UP	O	X	X	X	**PC**	POWER CONTROL	O	O	O	O
BY	BUSY	X	O	O	O	**PL**	SPEECH PROCESSOR LEVEL	O	O	O	O
CH	CHANNEL UP/DOWN	O	X	X	X	**PR**	SPEECH PROCESSOR	O	O	O	O
CN	CTCSS NUMBER	O	O	O	O	**PS**	POWER SWITH	O	O	O	X
CO	CONTOUR	O	O	O	O	**QI**	QMB STORE	O	X	X	X
CS	CW SPOT	O	O	O	O	**QR**	QMB RECALL	O	X	X	X
CT	CTCSS	O	O	O	O	**QS**	QUICK SPLIT	O	X	X	X
DA	DIMMER	O	O	O	X	**RA**	RF ATTENUATOR	O	O	O	O
DN	DOWN	O	X	X	X	**RC**	CLAR CLEAR	O	X	X	X
DP	DISPLAY	O	O	O	O	**RD**	CLAR DOWN	O	X	X	X
ED	ENCORDER DOWN	O	X	X	X	**RF**	ROOFING FILTER	O	O	O	O
EK	ENT KEY	O	X	X	X	**RG**	RF GAIN	O	O	O	O
EU	ENCORDER UP	O	X	X	X	**RI**	RADIO INFORMATION	X	O	O	O
EX	MENU	O	O	O	O	**RL**	NOISE REDUCTION LEVEL	O	O	O	O
FA	FREQUENCY VFO-A	O	O	O	O	**RM**	READ METER	X	O	O	O
FB	FREQUENCY VFO-B	O	O	O	O	**RO**	ROTATOR	O	O	O	X
FK	FUNCTION KEY	O	X	X	X	**RS**	RADIO STATUS	X	O	O	O
FR	FUNCTION RX	O	O	O	O	**RT**	CLAR	O	O	O	O
FS	FAST STEP	O	O	O	O	**RU**	CLAR UP	O	X	X	X
FT	FUNCTION TX	O	O	O	O	**SC**	SCAN	O	O	O	O
GT	AGC FUNCTION	O	O	O	O	**SD**	SEMI BREAK-IN DELAY TIME	O	O	O	O
ID	IDENTIFICATION	X	O	O	X	**SF**	SUB-DIAL FUNCTION	O	O	O	O
IF	INFORMATION	X	O	O	O	**SH**	WIDTH	O	O	O	O
IS	IF-SHIFT	O	O	O	O	**SM**	S METER	X	O	O	O
KM	KEYER MEMORY	O	O	O	X	**SQ**	SQUELCH LEVEL	O	O	O	O
KP	KEY PITCH	O	O	O	O	**SV**	SWAP VFO	O	X	X	X
KR	KEYER	O	O	O	O	**TS**	TXW	O	O	O	O
KS	KEY SPEED	O	O	O	O	**TX**	TX SET	O	O	O	O
KY	CW KEYING	O	X	X	X	**UL**	UNLOCK	X	O	O	O
LK	LOCK	O	O	O	O	**UP**	UP	O	X	X	X
LM	LOAD MESSEGE	O	O	O	X	**VD**	VOX DELAY TIME	O	O	O	O
MA	MEMORY CHANNEL TO VFO-A	O	X	X	X	**VF**	VRF FILTER	O	O	O	O
MC	MEMORY CHANNEL	O	O	O	X	**VG**	VOX GAIN	O	O	O	O
MD	MODE	O	O	O	O	**VM**	[V/M] KEY FUNCTION	O	X	X	X
MG	MIC GAIN	O	O	O	O	**VS**	VFO SELECT	O	O	O	O
MK	MODE KEY	O	X	X	X	**VX**	VOX	O	O	O	O
ML	MONITOR LEVEL	O	O	O	O	**XT**	TX CLAR	O	O	O	O
MR	MEMORY READ	X	O	O	X						

CONTROL COMMAND TABLES

AB	**VFO-A TO VFO-B**									
Set	1	2	3	4	5	6	7	8	9	10
	A	B	;							
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

AC	**ANTENNA TUNER CONTROL**									
Set	1	2	3	4	5	6	7	8	9	10
	A	C	P1	P2	P3	;				
Read	1	2	3	4	5	6	7	8	9	10
	A	C	;							
Answer	1	2	3	4	5	6	7	8	9	10
	A	C	P1	P2	P3	;				

P1 0: Fixed
P2 0: Fixed
P3 0: Tuner "OFF"
1: Tuner "ON"
2: Tuning Start

AG	**AF GAIN**									
Set	1	2	3	4	5	6	7	8	9	10
	A	G	P1	P2	P2	P2	;			
Read	1	2	3	4	5	6	7	8	9	10
	A	G	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	A	G	P1	P2	P2	P2	;			

P1 0: Fixed
P2 000 - 255

AI	**AUTO INFORMATION**									
Set	1	2	3	4	5	6	7	8	9	10
	A	I	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	A	I	;							
Answer	1	2	3	4	5	6	7	8	9	10
	A	I	P1	;						

P1 0: Auto Information "OFF"
1: Auto Information "ON"

This parameter is set to "0" (OFF) automatically when the transceiver is turned "OFF."

AM	**VFO-A TO MEMORY CHANNEL**									
Set	1	2	3	4	5	6	7	8	9	10
	A	M	;							
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

AN	**ANTENNA NUMBER**									
Set	1	2	3	4	5	6	7	8	9	10
	A	N	P1	P2	;					
Read	1	2	3	4	5	6	7	8	9	10
	A	N	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	A	N	P1	P3	P4	;				

P1 0: Fixed
P2 1: ANT "1"
2: ANT "2"
P3 1: ANT "1"
2: ANT "2"
P4 0: Fixed

BC	**AUTO NOTCH**									
Set	1	2	3	4	5	6	7	8	9	10
	B	C	P1	P2	;					
Read	1	2	3	4	5	6	7	8	9	10
	B	C	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	B	C	P1	P2	;					

P1 0: Fixed
P2 0: Auto Notch "OFF"
1: Auto Notch "ON"

BD	**BAND DOWN**									
Set	1	2	3	4	5	6	7	8	9	10
	B	D	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

P1 0: Fixed

BI	**BREAK-IN**									
Set	1	2	3	4	5	6	7	8	9	10
	B	I	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	B	I	;							
Answer	1	2	3	4	5	6	7	8	9	10
	B	I	P1	;						

P1 0: Break-in "OFF"
1: Break-in "ON"

CONTROL COMMAND TABLES

BP — MANUAL NOTCH

	1	2	3	4	5	6	7	8	9	10
Set	B	P	P1	P2	P3	P3	P3	;		
Read	B	P	P1	P2	;					
Answer	B	P	P1	P2	P3	P3	P3	;		

P1 0: Fixed
P2 0: Manual NOTCH "ON/OFF"
1: Manual NOTCH LEVEL
P3 When P2=0
000: OFF
001: ON
When P2=1
001 - 300 (NOTCH Frequency : x 10 Hz)

BS — BAND SELECT

	1	2	3	4	5	6	7	8	9	10
Set	B	S	P1	P1	;					
Read										
Answer										

P1 00: 1.8 MHz 06: 18 MHz
01: 3.5 MHz 07: 21 MHz
03: 7 MHz 08: 24.5 MHz
04: 10 MHz 09: 28 MHz
05: 14 MHz 10: 50 MHz
11: GEN

BU — BAND UP

	1	2	3	4	5	6	7	8	9	10
Set	B	U	P1	;						
Read										
Answer										

P1 0: Fixed

BY — BUSY

	1	2	3	4	5	6	7	8	9	10
Set										
Read	B	Y	;							
Answer	B	Y	P1	P2	;					

P1 0: BUSY "OFF"
1: BUSY "ON"
P2 0: Fixed

CH — CHANNEL UP/DOWN

	1	2	3	4	5	6	7	8	9	10
Set	C	H	P1	;						
Read										
Answer										

P1 0: Memory Channel "UP"
1: Memory Channel "DOWN"

CN — CTCSS TONE FREQUENCY

	1	2	3	4	5	6	7	8	9	10
Set	C	N	P1	P2	P2	;				
Read	C	N	P1	;						
Answer	C	N	P1	P2	P2	;				

P1 0: Fixed
P2 00 - 49: Tone Frequency Number (See Table Below)

CO — CONTOUR

	1	2	3	4	5	6	7	8	9	10
Set	C	O	P1	P2	P3	P3	;			
Read	C	O	P1	P2	;					
Answer	C	O	P1	P2	P3	P3	;			

P1 0: Fixed
P2 0: CONTOUR "ON/OFF"
1: CONTOUR LEVEL
P3 When P2=0,
000: CONTOUR "OFF"
001: CONTOUR "ON"
When P2=1,
01 - 30 (CONTOUR Frequency)

CS — CW SPOT

	1	2	3	4	5	6	7	8	9	10
Set	C	S	P1	;						
Read	C	S	;							
Answer	C	S	P1	;						

P1 0: OFF
1: ON

TABLE

CTCSS TONE CHART

00	67.0 Hz	09	91.5 Hz	18	123.0 Hz	27	162.2 Hz	36	189.9 Hz	45	229.1 Hz
01	69.3 Hz	10	94.8 Hz	19	127.3 Hz	28	165.5 Hz	37	192.8 Hz	46	233.6 Hz
02	71.9 Hz	11	97.4 Hz	20	131.8 Hz	29	167.9 Hz	38	196.6 Hz	47	241.8 Hz
03	74.4 Hz	12	100.0 Hz	21	136.5 Hz	30	171.3 Hz	39	199.5 Hz	48	250.3 Hz
04	77.0 Hz	13	103.5 Hz	22	141.3 Hz	31	173.8 Hz	40	203.5 Hz	49	254.1 Hz
05	79.7 Hz	14	107.2 Hz	23	146.2 Hz	32	177.3 Hz	41	206.5 Hz	–	–
06	82.5 Hz	15	110.9 Hz	24	151.4 Hz	33	179.9 Hz	42	210.7 Hz	–	–
07	85.4 Hz	16	114.8 Hz	25	156.7 Hz	34	183.5 Hz	43	218.1 Hz	–	–
08	88.5 Hz	17	118.8 Hz	26	159.8 Hz	35	186.2 Hz	44	225.7 Hz	–	–

CONTROL COMMAND TABLES

CT	CTCSS										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Fixed P2 0: CTCSS “OFF” 1: CTCSS ENC/DEC “ON” 2: CTCSS ENC “ON”
	C	T	P1	P2	;						
Read	1	2	3	4	5	6	7	8	9	10	
	C	T	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	C	T	P1	P2	;						

DA	DIMMER										
Set	1	2	3	4	5	6	7	8	9	10	P1 00 - 15: Backlight Brightness Level P2 00: Fixed
	D	A	P1	P1	P2	P2	;				
Read	1	2	3	4	5	6	7	8	9	10	
	D	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	D	A	P1	P1	P2	P2	;				

DN	MIC DWN										
Set	1	2	3	4	5	6	7	8	9	10	
	D	N	;								
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

DP	DISPLAY										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: World Clock Display 1: Band Scope Display 2: AF Oscilloscope/Spectrum Analyzer Display 3: Log Book Display 4: Temperature/SWR Display 5: Rotator Display 6: Memory Channel List Display ※: This command does not activates when the optional DMU-2000 Data Managemnt Unit is not attached.
	D	P	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	D	P	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	D	P	P1	;							

ED	ENCORDER DOWN										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: MAIN DIAL Knob 1: CLAR/VFO-B Knob 2: SELECT Knob P2 01-99: Steps
	E	D	P1	P2	P2	;					
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

EK	ENT KEY										
Set	1	2	3	4	5	6	7	8	9	10	
	E	K	;								
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

EU	ENCORDER UP										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: MAIN DIAL Knob 1: CLAR/VFO-B Knob 2: SELECT Knob P2 01-99: Steps
	E	U	P1	P2	P2	;					
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

Control Command Tables

EX	MENU										
Set	1	2	3	4	5	6	7	8	nn	**	P1 : 001-118 (MENU Number) P2 : Parameter (See Table 2 and Table 3)
	E	X	P1	P1	P1	P2	P2	~	P2	;	
Read	1	2	3	4	5	6	7	8	9	10	
	E	X	P1	P1	P1	;					
Answer	1	2	3	4	5	6	7	8	nn	**	
	E	X	P1	P1	P1	P2	P2	~	P2	;	

Table 2

P1	FUNCTION	P2
001	AGC FAST DELAY TIME	0020 ~ 4000 msec (20 msec/step)
002	AGC MID DELAY TIME	0020 ~ 4000 msec (20 msec/step)
003	AGC SLOW DELAY TIME	0020 ~ 4000 msec (20 msec/step)
004	DISPLAY COLOR	0: COOL BLUE 1: CONTRAST BLUE 2: FLASH BLUE 3: CONTRAST UMBER 4: UMBER
005	DISPLAY DIMMER	00 ~ 15
006	TUNING OFFSET INDICATOR	0: CLARIFIER OFFSET 1: CW TUNIG METER 2: VRF PEAK POSITION
007	S-METER PEAK HOLD	0: OFF 1: 0.5 sec 2: 1.0 sec 3: 2.0 sec
008	PO METER PEAK HOLD	0: OFF 1: 0.5 sec 2: 1.0 sec 3: 2.0 sec
009	ALC METER PEAK HOLD	0: OFF 1: 0.5 sec 2: 1.0 sec 3: 2.0 sec
010	ID METER PEAK HOLD	0: OFF 1: 0.5 sec 2: 1.0 sec 3: 2.0 sec
011	ROTATOR STARTING POINT	0: 0° 1: 90° 2: 180° 3: 270°
012	ROTATOR NEEDLE PRECISELY	00 ~ 30° (0 ~ –30°, 2° step)
013	QMB MAKER	0: OFF 1: ON
014	VOICE MEMORY AUDIO (DVS-6) OUTPUT LEVEL	000 ~ 100
015	VOICE MEMORY AUDIO (DVS-6) TX LEVEL	000 ~ 100
016	CW BEACON	000 (OFF) ~ 255 sec
017	CONTEST NUMBER STYLE	0: 1290 1: AunO 2: Aunt 3: A2nO 4: A2nt 5: 12nO 6: 12nt
018	CONTEST NUMBER	0000 ~ 9999
019	CW MEMORY "1" MEMORY TYPE	0: TEXT MEMORY 1: MESSAGE MEMORY
020	CW MEMORY "2" MEMORY TYPE	0: TEXT MEMORY 1: MESSAGE MEMORY
021	CW MEMORY "3" MEMORY TYPE	0: TEXT MEMORY 1: MESSAGE MEMORY
022	CW MEMORY "4" MEMORY TYPE	0: TEXT MEMORY 1: MESSAGE MEMORY
023	CW MEMORY "5" MEMORY TYPE	0: TEXT MEMORY 1: MESSAGE MEMORY
024	ANTENNA SELECTION MODE	0: BAND 1: STACK
025	BEEP LEVEL	000 ~ 100
026	CAT BAUD RATE	0: 4800 bps 1: 9600 bps 2: 19200 bps 3: 38400 bps
027	CAT TIME-OUT TIMER	0: 10 msec 1: 100 msec 2: 1000 msec 3: 3000 msec
028	CAT RTS PORT	0: OFF 1: ON
029	MEMORY GROUP	0: OFF 1: ON
030	QUICK SPLIT TUNING OFFSET	–20 ~ +00 (or –00) ~ +20 kHz
031	TX TIME OUT TIMER	00 (OFF) ~ 30 min
032	μ-TUNE DIAL	0: STEP-2 1: STEP-1
033	MIC SCAN	0: OFF 1: ON
034	SCAN RESUME	0 PAUSE 1: TIME
035	FREQUENCY ADJUST	–25 ~ +00 (or –00) ~ +25
036	AM MIC GAIN	1000: MIC KNOB 0000 ~ 0100 (FIX)
037	FRONT PANEL KEY JACK TYPE	0: OFF 1: BUG 2: IAMBIC KEYER W/O ACS 3: IAMBIC KEYER W/ACS
038	FRONT PANEL KEY JACK WIRING	0: NORNAL 1: REVERSE
039	REAR PANEL KEY JACK TYPE	0: OFF 1: BUG 2: IAMBIC KEYER W/O ACS 3: IAMBIC KEYER W/ACS
040	REAR PANEL KEY JACK WIRING	0: NORNAL 1: REVERSE
041	CW AUTO MODE	0: OFF 1: 50 MHz ONLY 2: ON
042	CW BFO INJECTION SIDE	0: USB 1: LSB 2: AUTO
043	CW BREAK-IN MODE	0: SEMI BREAK-IN 1: FULL BREAK-IN
044	CW BREAK-IN DELAY TIME	0030 ~ 3000 msec (10 msec/step)
045	CW PITCH FREQUENCY	00: 300 Hz, 01: 350 Hz, 02: 400 Hz, 03: 450 Hz, 04: 500 Hz, 05: 550 Hz 06: 600 Hz, 07: 650 Hz, 08: 700 Hz, 09: 750 Hz, 10: 800 Hz, 11: 850 Hz 12: 900 Hz, 13: 950 Hz, 14: 1000 Hz, 15: 1050 Hz
046	CW WEIGHT	25 (1:2.5) ~ 45 (1:4.5)
047	CW FREQUENCY DISPLAY	0: DIRECT FREQUENCY 1: PITCH OFFSET
048	CW PC KEYING	0: OFF 1: ON
049	CW QSK TIME	0: 15 msec 1: 20 msec 2: 25 mesc 3: 30 msec
050	DATA MODE TX GAIN	000 ~ 100
051	DATA MODE OUTPUT LEVEL	000 ~ 100
052	DATA MODE VOX DELAY TIME	0030 ~ 3000 msec (10 msec/step)
053	DATA MODE VOX GAIN	000 ~ 100
054	PACKET MODE FREQUENCY DISPLAY OFFSET	–3000 ~ +0000 (or –0000) ~ +3000 Hz (10 Hz/step)
055	PACKET MODE CARRIER POINT FREQUENCY	–3000 ~ +0000 (or –0000) ~ +3000 Hz (10 Hz/step)
056	FM MIC GAIN	1000: MIC KNOB 0000 ~ 0100 (FIX)
057	28 MHz REPEATER SHIFT	0000 ~ 1000 kHz (10 kHz/step)
058	50 MHz REPEATER SHIFT	0000 ~ 4000 kHz (10 kHz/step)
059	RTTY MODE RX POLARITY (MARK/SPACE)	0: NORNAL 1: REVERSE
060	RTTY MODE TX POLARITY (MARK/SPACE)	0: NORNAL 1: REVERSE
061	RTTY MODE DATA OUTPUT LEVEL	000 ~ 100
062	RTTY MODE SHIFT FREQUENCY	1: 170 Hz 1: 200 Hz 2: 425 Hz 3: 850 Hz
063	RTTY MODE MARK FREQUENCY	1: 1275 Hz 2: 2125 Hz
064	SSB MODE TX BPF BANDWIDTH	0: 100 - 3000 Hz 1: 100 - 2900 Hz 2: 200 - 2800 Hz 3: 300 - 2700 Hz 4: 400 - 2600 Hz
065	LSB CARRIER POINT	–200 ~ +000 (or –000) ~ +200 Hz (10 Hz/step)
066	USB CARRIER POINT	–200 ~ +000 (or –000) ~ +200 Hz (10 Hz/step)
067	NB LEVEL (NARROW)	000 ~ 255
068	NB LEVEL (WIDE)	000 ~ 255
069	CONTOUR GAIN	–40 ~ +00 (or –00) ~ +20 dB
070	CONTOUR WIDTH	01 ~ 11
071	DIGITAL NOTCH FILTER	0: OFF 1: ON
072	DIGITAL NOISE REDUCTION	00 (OFF) ~ 15

CONTROL COMMAND TABLES

TABLE 3

P1	FUNCTION	P2
073	SPECTRUM SCOPE SCAN START FREQUENCY (1.8 MHz)	01800 ~ 01999 (1.800 MHz ~ 1.999 MHz)
074	SPECTRUM SCOPE SCAN START FREQUENCY (3.5 MHz)	03500 ~ 03999 (3.500 MHz ~ 3.999 MHz)
075	SPECTRUM SCOPE SCAN START FREQUENCY (5.0 MHz)	05250 ~ 05499 (5.250 MHz ~ 5.499 MHz)
076	SPECTRUM SCOPE SCAN START FREQUENCY (7.0 MHz)	07000 ~ 07299 (7.000 MHz ~ 7.299 MHz)
077	SPECTRUM SCOPE SCAN START FREQUENCY (10 MHz)	10100 ~ 10149 (10.100 MHz ~ 10.149 MHz)
078	SPECTRUM SCOPE SCAN START FREQUENCY (14 MHz)	14000 ~ 14349 (14.000 MHz ~ 14.349 MHz)
079	SPECTRUM SCOPE SCAN START FREQUENCY (18 MHz)	18000 ~ 18199 (18.000 MHz ~ 18.199 MHz
080	SPECTRUM SCOPE SCAN START FREQUENCY (21 MHz)	21000 ~ 21449 (21.000 MHz ~ 21.449 MHz)
081	SPECTRUM SCOPE SCAN START FREQUENCY (24.5 MHz)	24800 ~ 24989 (24.800 MHz ~ 24.989 MHz)
082	SPECTRUM SCOPE SCAN START FREQUENCY (28 MHz)	28000 ~ 29699 (28.000 MHz ~ 29.699 MHz)
083	SPECTRUM SCOPE SCAN START FREQUENCY (50 MHz)	50000 ~ 53999 (50.000 MHz ~ 53.999 MHz)
084	MAIN TUNING DIAL KNOB DIALSTEP	0: 1 Hz 1: 5 Hz 2: 10 Hz
085	MAIN TUNING DIAL KNOB CW FINE TUNING	0: OFF 1: ON
086	CLAR/VFO-B KNOB MHz STEP	0: 0.1 MHz 1: MHz
087	MICROPHNE [UP]/[DOWN] KEY AM STEP	0: 2.5 kHz 1: 5 kHz 2: 9 kHz 3: 10 kHz 4:12.5 kHz
088	MICROPHNE [UP]/[DOWN] KEY FM STEP	0: 5 kHz 1: 6.25 kHz 2: 10 kHz 3: 12.5 kHz 4: 20 kHz 5: 25 kHz
089	MAIN TUNING DIAL KNOB DIALSTEP (FM MODE)	0: 10 Hz 1: 100 Hz
090	MY BAND SELECT	0: OFF 1: ON P2(6): 1.8 MHz P2(7): 3.5 MHz P2(8): 5 MHz P2(9): 7 MHz P2(10): 10 MHz P2(11): 14 MHz P2(12): 18 MHz P2(13): 21 MHz P2(14): 24.5 MHz P2(15): 28 MHz P2(16): 50 MHz P2(17): GENERAL P2(17): TRANSVERTER Example: P2 = 1101010101100 (My Band = 1.8/3.5/7/14/21/28/50 MHz)
091	MIC EQUAQLIZER CENTER FREQUENCY (LOW RANGE)	00: OFF 01: 100 Hz 02: 200 Hz 03: 300 Hz 04: 400 Hz 05: 500 Hz 06: 600 Hz 07: 700 Hz
092	MIC EQUAQLIZER GAIN (LOW RANGE)	–10 ~ +00 (or –00) ~ +10
093	MIC EQUAQLIZER BANDWIDTH (LOW RANGE)	1 ~ 10
094	MIC EQUAQLIZER CENTER FREQUENCY (MID RANGE)	00: OFF 01: 700 Hz 02: 800 Hz 03: 900 Hz 04: 1000 Hz 05: 1100 Hz 06: 1200 Hz 07: 1300 Hz 08: 1400 Hz 09: 1500 Hz
095	MIC EQUAQLIZER GAIN (MID RANGE)	–10 ~ +00 (or –00) ~ +10
096	MIC EQUAQLIZER BANDWIDTH (MID RANGE)	01 ~ 10
097	MIC EQUAQLIZER CENTER FREQUENCY (HIGH RANGE)	00: OFF 01: 1500 Hz 02: 1600 Hz 03: 1700 Hz 04: 18000 Hz 05: 1900 Hz 06: 2000 Hz 07: 2100 Hz 08: 2200 Hz 09: 2300 Hz 10: 2400 Hz 11: 2500 Hz 12: 2600 Hz 13: 2700 Hz 14: 2800 Hz 15: 2900 Hz 16: 3000 Hz 17: 3100 Hz 18: 3200 Hz
098	MIC EQUAQLIZER GAIN (HIGH RANGE)	–10 ~ +00 (or –00) ~ +10
099	MIC EQUAQLIZER BANDWIDTH (HIGH RANGE)	01 ~ 10
100	SPEECH PROCESSOR EQUAQLIZER CENTER FREQUENCY (LOW RANGE)	00: OFF 01: 100 Hz 02: 200 Hz 03: 300 Hz 04: 400 Hz 05: 500 Hz 06: 600 Hz 07: 700 Hz
101	SPEECH PROCESSOR EQUAQLIZER GAIN (LOW RANGE)	–10 ~ +00 (or –00) ~ +10
102	SPEECH PROCESSOR EQUAQLIZER BANDWIDTH (LOW RANGE)	1 ~ 10
103	SPEECH PROCESSOR EQUAQLIZER CENTER FREQUENCY (MID RANGE)	00: OFF 01: 700 Hz 02: 800 Hz 03: 900 Hz 04: 1000 Hz 05: 1100 Hz 06: 1200 Hz 07: 1300 Hz 08: 1400 Hz 09: 1500 Hz
104	SPEECH PROCESSOR EQUAQLIZER GAIN (MID RANGE)	–10 ~ +00 (or –00) ~ +10
105	SPEECH PROCESSOR EQUAQLIZER BANDWIDTH (MID RANGE)	01 ~ 10
106	SPEECH PROCESSOR EQUAQLIZER CENTER FREQUENCY (HIGH RANGE)	00: OFF 01: 1500 Hz 02: 1600 Hz 03: 1700 Hz 04: 18000 Hz 05: 1900 Hz 06: 2000 Hz 07: 2100 Hz 08: 2200 Hz 09: 2300 Hz 10: 2400 Hz 11: 2500 Hz 12: 2600 Hz 13: 2700 Hz 14: 2800 Hz 15: 2900 Hz 16: 3000 Hz 17: 3100 Hz 18: 3200 Hz
107	SPEECH PROCESSOR EQUAQLIZER GAIN (HIGH RANGE)	–10 ~ +00 (or –00) ~ +10
108	SPEECH PROCESSOR EQUAQLIZER BANDWIDTH (HIGH RANGE)	01 ~ 10
109	SPEECH PROCESSOR COMPRESSION LEVEL	000 ~ 100
110	ANTENNA TUNER SELECT	0: INTERNAL TUNER 1: EXTERNAL (FC-40) TUNER
111	TRANSMITTER OUTPUT POWER	005 ~ 100
112	AM CARRIER LEVEL	000 ~ 100
113	TX POWER CONTROL	0: ALL MODE 1: CARRIER
114	VOX OPERATION	0: MIC INPUT 1: DATA INPUT
115	VOX GAIN	000 ~ 100
116	VOX DELAY TIME	0030 ~ 3000 msec (10 msec/step)
117	VOX ANTI-TRIP GAIN	000 ~ 100
118	EMERGENCY CHANNEL	0: DISABLE 1: ENABLE

CONTROL COMMAND TABLES

FA	FREQUENCY VFO-A										
Set	1	2	3	4	5	6	7	8	9	10	P1 0030000 - 56000000 (Hz)
	F	A	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	
	;										
Read	1	2	3	4	5	6	7	8	9	10	
	F	A	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	F	A	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	
	;										

FB	FREQUENCY VFO-B										
Set	1	2	3	4	5	6	7	8	9	10	P1 0030000 - 56000000 (Hz)
	F	B	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	
	P1	P1	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	F	B	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	F	B	P1	P1	P1	P1	P1	P1	P1	P1	
	11	12	13	14	15	16	17	18	19	20	
	P1	P1	P1	;							

FK	FUNCTION KEY										
Set	1	2	3	4	5	6	7	8	9	10	P1 1: F1 ([1.8(1)]) key 2: F2 ([3.5(2)]) key 3: F3 ([7(3)]) key 4: F4 ([10(4)]) key 5: F5 ([14(5)]) key 6: F6 ([18(6)]) key 7: F7 ([21(7)]) key
	F	K	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

FR	FUNCTION RX										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: VFO-A: RX, VFO-B: "OFF" 1: VFO-A: Mute, VFO-B: "OFF" 4: VFO-A): "OFF", VFO-B: RX 5: VFO-A: "OFF", VFO-B: Mute
	F	R	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	F	R	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	F	R	P1	;							

FS	FAST STEP										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: FAST Key "OFF" 1: FAST Key "ON"
	F	S	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	F	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	F	S	P1	;							

FT	FUNCTION TX										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: VFO-A: TX/RX (Toggle) 1: VFO-B: TX/RX (Toggle) 2: VFO-A: TX 3: VFO-B: TX P2 0: VFO-A: TX 1: VFO-B: TX
	F	T	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	F	T	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	F	T	P2	;							

GT	AGC FUNCTION										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Fixed P2 0: AGC "OFF" 1: AGC "FAST" 2: AGC "MID" 3: AGC "SLOW" 4: AGC "AUTO" P3 0: AGC "OFF" 1: AGC "FAST" 2: AGC "MID" 3: AGC "SLOW" 4: AGC "AUTO-FAST" 5: AGC "AUTO-MID" 6: AGC "AUTO-SLOW"
	G	T	P1	P2	;						
Read	1	2	3	4	5	6	7	8	9	10	
	G	T	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	G	T	P1	P3	;						

ID	IDENTIFICATION										
Set	1	2	3	4	5	6	7	8	9	10	P1 0310 (Fixed value)
Read	1	2	3	4	5	6	7	8	9	10	
	I	D	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	I	D	P1	P1	P1	P1	;				

Control Command Tables

IF	**INFORMATION**									
Set	1	2	3	4	5	6	7	8	9	10
Read	1	2	3	4	5	6	7	8	9	10
	I	F	;							
Answer	1	2	3	4	5	6	7	8	9	10
	I	F	P1	P1	P1	P2	P2	P2	P2	P2
	11	12	13	14	15	16	17	18	19	20
	P2	P2	P2	P3	P3	P3	P3	P3	P4	P5
	21	22	23	24	25	26	27	28	29	30
	P6	P7	P8	P9	P9	P10	;			

P1 000-117 (Memory Channel) P2 VFO-A Frequency (Hz)
P3 Clarifier Direction +: Plus Shift, −: Minus Shift
Clarifier Offset: 0000 - 9999 (Hz)
P4 0: RX CLAR “OFF” 1: RX CLAR “ON”
P5 0: TX CLAR “OFF” 1: TX CLAR “ON”
P6 MODE 1: LSB 2: USB 3: CW 4: FM 5: AM 6: FSK (RTTY-LSB) 7: CW-R 8: PKT-L 9: FSK-R (RTTY-USB) A: PKT-FM B: FM-N C: PKT-U
P7 0: VFO 1: Memory 2: Memory Tune 3: Quick Memory Bank (QMB) 4: QMB-MT
P8 0: CTCSS “OFF” 1: CTCSS ENC/DEC 2: CTCSS ENC
P9: Tone Number (See Table 1)
P10 0: Simplex 1: Plus Shift 2: Minus Shift

IS	**IF-SHIFT**									
Set	1	2	3	4	5	6	7	8	9	10
	I	S	P1	-/+	P2	P2	P2	P2	;	
Read	1	2	3	4	5	6	7	8	9	10
	I	S	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	I	S	P1	-/+	P2	P2	P2	P2	;	

P1 0: Fixed
P2 −1000 ~ +1000 Hz

KM	**KEYER MEMORY**									
Set	1	2	3	4	5	6	7	~	53	**
	K	M	P1	P2	P2	P2	P2	~	P2	;
Read	1	2	3	4	5	6	7	8	9	10
	K	M	P1	;						
Answer	1	2	3	4	5	6	7	~	53	**
	K	M	P1	P2	P2	P2	P2	~	P2	;

P1 1 - 5 : Keyer Memory Channel Number
P2 Message Characters (up to 50 characters)

KP	**KEY PITCH**									
Set	1	2	3	4	5	6	7	8	9	10
	K	P	P1	P1	;					
Read	1	2	3	4	5	6	7	8	9	10
	K	P	;							
Answer	1	2	3	4	5	6	7	8	9	10
	K	P	P1	P1	;					

P1 00: 300 Hz 01: 350 Hz 02: 400 Hz 03: 450 Hz 04: 500 Hz 05: 550 Hz 06: 600 Hz 07: 650 Hz 08: 700 Hz 09: 750 Hz 10: 800 Hz 11: 850 Hz 12: 900 Hz 13: 950 Hz 14: 1000 Hz 15: 1050 Hz

KR	**KEYER**									
Set	1	2	3	4	5	6	7	8	9	10
	K	R	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	K	R	;							
Answer	1	2	3	4	5	6	7	8	9	10
	K	R	P1	;						

P1 0: KEYER “OFF”
1: KEYER “ON”

KS	**KEY SPEED**									
Set	1	2	3	4	5	6	7	8	9	10
	K	S	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10
	K	S	;							
Answer	1	2	3	4	5	6	7	8	9	10
	K	S	P1	P1	P1	;				

P1 004 - 060 (WPM)

KY	**CW KEYING**									
Set	1	2	3	4	5	6	7	8	9	10
	K	Y	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

P1 1: Keyer Memory “1” Playback
2: Keyer Memory “2” Playback
3: Keyer Memory “3” Playback
4: Keyer Memory “4” Playback
5: Keyer Memory “5” Playback
6: Message Keyer “1” Playback
7: Message Keyer “2” Playback
8: Message Keyer “3” Playback
9: Message Keyer “4” Playback
A: Message Keyer “5” Playback

LK	**LOCK**									
Set	1	2	3	4	5	6	7	8	9	10
	L	K	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
	L	K	;							
Answer	1	2	3	4	5	6	7	8	9	10
	L	K	P1	;						

P1 0: DIAL Lock “OFF”
1: DIAL Lock “ON”

Control Command Tables

LM	LOAD MESSEGE									
Set	1	2	3	4	5	6	7	8	9	10
	L	M	P1	P2	;					
Read	1	2	3	4	5	6	7	8	9	10
	L	M	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	L	M	P1	P2	;					

P1 0: Fixed
P2 0: DVS-6 (Recording Stop)
1: DVS-6 (CH “1” Recording Start/Stop)
2: DVS-6 (CH “2” Recording Start/Stop)
3: DVS-6 (CH “3” Recording Start/Stop)
4: DVS-6 (CH “4” Recording Start/Stop)
5: DVS-6 (CH “5” Recording Start/Stop)

※: This command does not activates when the optional DVS-6 Voice Memory Unit is not installed.

MA	MEMORY CHANNEL TO VFO-A									
Set	1	2	3	4	5	6	7	8	9	10
	M	A	;							
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

MC	MEMORY CHANNEL									
Set	1	2	3	4	5	6	7	8	9	10
	M	C	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10
	M	C	;							
Answer	1	2	3	4	5	6	7	8	9	10
	M	C	P1	P1	P1	;				

P1 000 - 117: Memory Channel Number
000 - 099: Regular Memory Channel
100: P1L
101: P1U
~
116: P9L
117: P9U

MD	OPERATING MODE									
Set	1	2	3	4	5	6	7	8	9	10
	M	D	P1	P2	;					
Read	1	2	3	4	5	6	7	8	9	10
	M	D	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	M	D	P1	P2	;					

P1 0: Fixed
P2 MODE 1: LSB 2: USB 3: CW 4: FM 5: AM 6: FSK (RTTY-LSB)
7: CW-R 8: PKT-L 9: FSK-R (RTTY-USB) A: PKT-FM
B: FM-N C: PKT-U D: AM-N

MG	MIC GAIN									
Set	1	2	3	4	5	6	7	8	9	10
	M	G	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10
	M	G	;							
Answer	1	2	3	4	5	6	7	8	9	10
	M	G	P1	P1	P1	;				

P1 000 - 255

MK	MODE KEY									
Set	1	2	3	4	5	6	7	8	9	10
	M	K	P1	;						
Read	1	2	3	4	5	6	7	8	9	10
Answer	1	2	3	4	5	6	7	8	9	10

P1 0: SSB key
1: SSB key
2: CW key
3: AM/FM key
4: AM/FM key
5: RTTY/PKT key
6: RTTY/PKT key

ML	MONITOR LEVEL									
Set	1	2	3	4	5	6	7	8	9	10
	M	L	P1	P2	P2	P2	;			
Read	1	2	3	4	5	6	7	8	9	10
	M	L	P1	;						
Answer	1	2	3	4	5	6	7	8	9	10
	M	L	P1	P2	P2	P2	;			

P1 0: MONI “ON/OFF”
1: MONI Level
P2 When P1=0
000: MONI “OFF”
001: MONI “ON”
When P1=1
001 - 255

MR	MEMORY CHANNEL READ									
Set	1	2	3	4	5	6	7	8	9	10
Read	1	2	3	4	5	6	7	8	9	10
	M	R	P1	P1	P1	;				
Answer	1	2	3	4	5	6	7	8	9	10
	M	R	P1	P1	P1	P2	P2	P2	P2	P2
	11	12	13	14	15	16	17	18	19	20
	P2	P2	P2	P3	P3	P3	P3	P3	P4	P5
	21	22	23	24	25	26	27	28	29	30
	P6	P7	P8	P9	P9	P10	;			

P1 Memory Channel Number
P2 Memory Channel Frequency (Hz)
P3 Clarifier Direction +: Plus Shift, −: Minus Shift
Clarifier Offset: 0000 - 9999 (Hz)
P4 0: RX CLAR “OFF” 1: RX CLAR “ON”
P5 0: TX CLAR “OFF” 1: TX CLAR “ON”
P6 MODE 1: LSB 2: USB 3: CW 4: FM 5: AM 6: FSK (RTTY-LSB)
7: CW-R 8: PKT-L 9: FSK-R (RTTY-USB) A: PKT-FM
B: FM-N C: PKT-U
P7 0: VFO 1: Memory
P8 0: CTCSS “OFF” 1: CTCSS ENC/DEC 2: CTCSS ENC
P9: Tone Number (See Table 1)
P10 0: Simplex 1: Plus Shift 2: Minus Shift

Control Command Tables

MS — METER SW

	1	2	3	4	5	6	7	8	9	10
Set	M	S	P1	;						
Read	M	S	;							
Answer	M	S	P1	;						

P1 0: COMP
1: ALC
3: SWR
4: ID
5: VDD

MW — MEMORY CHANNEL WRITE

	1	2	3	4	5	6	7	8	9	10
Set	M	W	P1	P1	P1	P2	P2	P2	P2	P2
	11	12	13	14	15	16	17	18	19	20
	P2	P2	P2	P3	P3	P3	P3	P3	P4	P5
	21	22	23	24	25	26	27	28	29	30
	P6	P7	P8	P9	P9	P10	;			
Read										
Answer										

P1 Memory Channel Number P2 Memory Channel Frequency (Hz)
P3 Clarifier Direction +: Plus Shift, −: Minus Shift
Clarifier Offset: 0000 - 9999 (Hz)
P4 0: RX CLAR "OFF" 1: RX CLAR "ON"
P5 0: TX CLAR "OFF" 1: TX CLAR "ON"
P6 MODE 1: LSB 2: USB 3: CW 4: FM 5: AM 6: FSK (RTTY-LSB)
7: CW-R 8: PKT-L 9: FSK-R (RTTY-USB) A: PKT-FM
B: FM-N C: PKT-U
P7 0: (Fixed)
P8 0: CTCSS "OFF" 1: CTCSS ENC/DEC 2: CTCSS ENC
P9: Tone Number (See Table on page 5)
P10 0: Simplex 1: Plus Shift 2: Minus Shift

MX — MOX SET

	1	2	3	4	5	6	7	8	9	10
Set	M	X	P1	;						
Read	N	X	;							
Answer	N	X	P1	;						

P1 0: MOX "OFF"
1: MOX "ON"

NA — NARROW

	1	2	3	4	5	6	7	8	9	10
Set	M	A	P1	P2	;					
Read	N	A	P1	;						
Answer	N	A	P1	P2	;					

P1 0: Fixed
P2 0: NARROW "OFF"
1: NARROW "ON"

NB — NOISE BLANKER STATUS

	1	2	3	4	5	6	7	8	9	10
Set	N	B	P1	P2	;					
Read	N	B	P1	;						
Answer	N	B	P1	P2	;					

P1 0: Fixed
P2 0: Noise Blanker "OFF"
1: Noise Blanker "ON"
2: Noise Blanker (Wide) "ON"

NL — NOISE BLANKER LEVEL

	1	2	3	4	5	6	7	8	9	10
Set	N	L	P1	P2	P2	P2	;			
Read	N	L	P1	;						
Answer	N	L	P1	P2	P2	P2	;			

P1 0: Fixed
P2 000 - 255

NR — NOISE REDUCTION

	1	2	3	4	5	6	7	8	9	10
Set	N	R	P1	P2	;					
Read	N	R	P1	;						
Answer	N	R	P1	P2	;					

P1 0: Fixed
P2 0: Noise Reduction "OFF"
1: Noise Reduction "ON"

OI — OPPOSITE BAND INFORMATION

	1	2	3	4	5	6	7	8	9	10
Set										
Read	O	I	;							
Answer	O	I	P1	P1	P1	P2	P2	P2	P2	P2
	11	12	13	14	15	16	17	18	19	20
	P2	P2	P2	P3	P3	P3	P3	P3	P4	P5
	21	22	23	24	25	26	27	28	29	30
	P6	P7	P8	P9	P9	P10	;			

P1 Current Memory Channel P2 VFO-B Frequency (Hz)
P3 Clarifier Direction +: Plus Shift, −: Minus Shift
Crarifier Offset: 0000 - 9999 (Hz)
P4 0: RX CLAR "OFF" 1: RX CLAR "ON"
P5 0: TX CLAR "OFF" 1: TX CLAR "ON"
P6 MODE 1: LSB 2: USB 3: CW 4: FM 5: AM 6: FSK (RTTY-LSB)
7: CW-R 8: PKT-L 9: FSK-R (RTTY-USB) A: PKT-FM
B: FM-N C: PKT-U
P7 0: VFO 1: Memory
P8 0: CTCSS "OFF" 1: CTCSS ENC/DEC 2: CTCSS ENC
P9: Tone Number (See Table on page 5)
P10 0: Simplex 1: Plus Shift 2: Minus Shift

Control Command Tables

OS	OFFSET (REPEATER SHIFT)										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Fixed P2 0: Simplex 1: Plus Shift 2: Minus Shift ※: This command can be activated only with an FM mode.
	O	**S**	P1	P2	;						
Read	1	2	3	4	5	6	7	8	9	10	
	O	**S**	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	O	**S**	P1	P2	;						

PA	PRE-AMP (IPO)										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Fixed P2 0: IPO 1: AMP 1 2: AMP 2
	P	**A**	P1	P2	;						
Read	1	2	3	4	5	6	7	8	9	10	
	P	**A**	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	P	**A**	P1	P2	;						

PB	PLAY BACK										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Fixed P2 0: DVS-6 (Recording Stop) 1: DVS-6 (CH "1" Recording Start/Stop) 2: DVS-6 (CH "2" Recording Start/Stop) 3: DVS-6 (CH "3" Recording Start/Stop) 4: DVS-6 (CH "4" Recording Start/Stop) 5: DVS-6 (CH "5" Recording Start/Stop) ※: This command does not activates when the optional DVS-6 Voice Memory Unit is not installed.
	P	**B**	P1	P2	;						
Read	1	2	3	4	5	6	7	8	9	10	
	P	**B**	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	P	**B**	P1	P2	;						

PC	POWER CONTROL										
Set	1	2	3	4	5	6	7	8	9	10	P1 005 - 100
	P	**C**	P1	P1	P1	;					
Read	1	2	3	4	5	6	7	8	9	10	
	P	**C**	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	P	**C**	P1	P1	P1	;					

PL	SPEECH PROCESSOR LEVEL										
Set	1	2	3	4	5	6	7	8	9	10	P1 000 - 100
	P	**L**	P1	P1	P1	;					
Read	1	2	3	4	5	6	7	8	9	10	
	P	**L**	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	P	**L**	P1	P1	P1	;					

PR	SPEECH PROCESSOR										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Speech Processor "OFF" 1: Speech Processor "ON" 2: Parametric Microphone Equalizer "ON"
	P	**R**	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	P	**R**	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	P	**R**	P1	;							

PS	POWER SWITCH										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: POWER "OFF" 1: POWER "ON" This command requires dummy data be initially sent. Then after one second and before two seconds the command is sent.
	P	**S**	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	P	**S**	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	P	**S**	P1	;							

QI	QMB STORE										
Set	1	2	3	4	5	6	7	8	9	10	
	Q	**I**	;								
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

QR	QMB RECALL										
Set	1	2	3	4	5	6	7	8	9	10	
	Q	**R**	;								
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

CONTROL COMMAND TABLES

QS	QUICK SPLIT										
Set	1	2	3	4	5	6	7	8	9	10	
	Q	S	;								
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

RA	RF ATTENUATOR										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Fixed P2 0: OFF 1: 6 dB 2: 12 dB 3: 18 dB
	R	A	P1	P2	;						
Read	1	2	3	4	5	6	7	8	9	10	
	R	A	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	R	A	P1	P2	;						

RC	CLAR CLEAR										
Set	1	2	3	4	5	6	7	8	9	10	
	R	C	;								
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

RD	CLAR MINUS OFFSET										
Set	1	2	3	4	5	6	7	8	9	10	P1 0000 - 9999 (Hz)
	R	D	P1	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

RF	ROOFING FILTER										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Fixed P2 0: AUTO 1: 15 kHz 2: 6 kHz 3: 3 kHz P3 1: 15 kHz 2: 6 kHz 3: 3 kHz 4: AUTO - 15 kHz 5: AUTO - 6kHz 6: AUTO - 3 kHz
	R	F	P1	P2	;						
Read	1	2	3	4	5	6	7	8	9	10	
	R	F	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	R	F	P1	P3	;						

RG	RF GAIN										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Fixed P2 000 - 255
	R	G	P1	P2	P2	P2	;				
Read	1	2	3	4	5	6	7	8	9	10	
	R	G	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	R	G	P1	P2	P2	P2	;				

RI	RADIO INFORMATION										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Hi-SWR 1: MIC-EQ 3: REC 4: PLAY P2 0: OFF 1: ON
Read	1	2	3	4	5	6	7	8	9	10	
	R	I	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	R	I	P1	P2	;						

RL	NOISE REDUCTION LEVEL										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Fixed P2 01 - 15
	R	L	P1	P2	P2	;					
Read	1	2	3	4	5	6	7	8	9	10	
	R	L	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	R	L	P1	P2	P2	;					

RM	READ METER										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: S/PO Meter 1: S Meter 2: Depends of the front panel's METER switch 3: COMP Meter 4: ALC Meter 5: PO Meter 6: SWR Meter 7: ID Meter 8: VDD Meter P2 0 - 255
Read	1	2	3	4	5	6	7	8	9	10	
	R	M	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	R	M	P1	P2	P2	P2	;				

Control Command Tables

RO — ROTATOR

	1	2	3	4	5	6	7	8	9	10
Set	R	O	P1	;						
Read	R	O	;							
Answer	R	O	P1	P2	P2	P2	P3	P3	P3	;

P1 0: OFF
1: Counter Clockwise
2: Clockwise
3: SPEED 1 % DOWN
4: SPEED 1 % UP
P2 DIRECTION (0 - 450)
P3 SPEED (0 - 100 %)

RS — RADIO STATUS

	1	2	3	4	5	6	7	8	9	10
Set										
Read	R	S	;							
Answer	R	S	P1	;						

P1 0: NORMAL MODE
1: MENU MODE
2: MENU Read (from Optional DMU-2000 Data Managemnt Unit)

RT — CLAR

	1	2	3	4	5	6	7	8	9	10
Set	R	T	P1	;						
Read	R	T	;							
Answer	R	T	P1	;						

P1 0: RX Clarifier "OFF"
1: RX Clarifier "ON"

RU — RX CLARIFIER PLUS OFFSET

	1	2	3	4	5	6	7	8	9	10
Set	R	U	P1	P1	P1	P1	;			
Read										
Answer										

P1 0000 - 9999 (Hz)

SC — SCAN

	1	2	3	4	5	6	7	8	9	10
Set	S	C	P1	;						
Read	S	C	;							
Answer	S	C	P1	;						

P1 0: Scan "OFF"
1: Scan "ON" (Upward)
2: Scan "ON" (Downward)

SD — CW BREAK-IN DELAY TIME

	1	2	3	4	5	6	7	8	9	10
Set	S	D	P1	P1	P1	P1	;			
Read	S	D	;							
Answer	S	D	P1	P1	P1	P1	;			

P1 0000: Full Break-in
0030 - 3000 mS (10 mS/step)

SF — CLAR/VFO-B KNOB FUNCTION

	1	2	3	4	5	6	7	8	9	10
Set	S	F	P1	;						
Read	S	F	;							
Answer	S	F	P1	;						

P1 0: BAND
1: MHz
2: GRP
3: MCH
8: Off (Read only)

SH — WIDTH

	1	2	3	4	5	6	7	8	9	10
Set	S	H	P1	P2	P2	;				
Read	S	H	P1	;						
Answer	S	H	P1	P2	P2	;				

P1 0: Fixed
P2 00-13: Bandwidth (See Table on the next page)

SM — S-METER READING

	1	2	3	4	5	6	7	8	9	10
Set										
Read	S	M	P1	;						
Answer	S	M	P1	P2	P2	P2	;			

P1 0: Fixed
P2 000 - 255

Control Command Tables

SQ	SQUELCLH LEVEL										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Fixed P2 000 - 255
	S	Q	P1	P2	P2	P2	;				
Read	1	2	3	4	5	6	7	8	9	10	
	S	Q	P1	;							
Answer	1	2	3	4	5	6	7	8	9	10	
	S	Q	P1	P2	P2	P2	;				

SV	SWAP VFO										
Set	1	2	3	4	5	6	7	8	9	10	
	S	V	;								
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

TS	TXW										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: TXW “OFF” 1: TXW “ON”
	T	S	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	T	S	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	T	S	P1	;							

TX	TX SET										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: RADIO TX “OFF” CAT TX “OFF” 1: RADIO TX “OFF” CAT TX “ON” 2: RADIO TX “ON” CAT TX “OFF” (Answer)
	T	X	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	T	X	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	T	X	P1	;							

UL	PLL UNLOCK STATUS										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: PLL “Lock” 1: PLL “Unlock”
Read	1	2	3	4	5	6	7	8	9	10	
	U	L	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	U	L	P1	;							

UP	UP										
Set	1	2	3	4	5	6	7	8	9	10	
	U	P	;								
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

Command	Bandwidth					
P2	SSB (Narrow)	SSB (Wide)	CW (Narrow)	CW (Wide)	RTTY/PKT (Narrow)	RTTY/PKT (Wide)
00	1800 Hz	2400 Hz	500 Hz	2400 Hz	300 Hz	500 Hz
01	200 Hz	—	—	—	—	—
02	400 Hz	—	—	—	—	—
03	600 Hz	—	100 Hz	—	100 Hz	—
04	850 Hz	—	200 Hz	—	200 Hz	—
05	1100 Hz	—	300 Hz	—	300 Hz	—
06	1350 Hz	—	400 Hz	—	400 Hz	—
07	1500 Hz	—	500 Hz	500 Hz	500 Hz	500 Hz
08	1650 Hz	—	—	800 Hz	—	800 Hz
09	1800 Hz	1800 Hz	—	1200 Hz	—	1200 Hz
10	—	1950 Hz	—	1400 Hz	—	1400 Hz
11	—	2100 Hz	—	1700 Hz	—	1700 Hz
12	—	2250 Hz	—	2000 Hz	—	2000 Hz
13	—	2400 Hz	—	2400 Hz	—	2400 Hz
14	—	2450 Hz	—	—	—	—
15	—	2500 Hz	—	—	—	—
16	—	2600 Hz	—	—	—	—
17	—	2700 Hz	—	—	—	—
18	—	2800 Hz	—	—	—	—
19	—	2900 Hz	—	—	—	—
20	—	3000 Hz	—	—	—	—

Control Command Tables

VD	VOX DELAY TIME										
Set	1	2	3	4	5	6	7	8	9	10	P1 0030 - 3000 mS (10 mS/step)
	V	**D**	P1	P1	P1	P1	;				
Read	1	2	3	4	5	6	7	8	9	10	
	V	**D**	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	V	**D**	P1	P1	P1	P1	;				

VF	VRF FILTER										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: Fixed P2 0: OFF 1: ON 2: Default set P3 +: Plus Shift –: Minus Shift P4 0 - 9 (Step) P5 000 - 255 P6 1: Fixed
	V	**F**	P1	P2	P3	P4	;				
Read	1	2	3	4	5	6	7	8	9	10	
	V	**F**	P1;								
Answer	1	2	3	4	5	6	7	8	9	10	
	V	**F**	P1	P2	P5	P5	P5	P6	;		

VG	VOX GAIN										
Set	1	2	3	4	5	6	7	8	9	10	P1 000 - 100
	V	**G**	P1	P1	P1	;					
Read	1	2	3	4	5	6	7	8	9	10	
	V	**G**	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	V	**G**	P1	P1	P1	;					

VM	VFO-A TO MEMORY CHANNEL										
Set	1	2	3	4	5	6	7	8	9	10	
	V	**M**	;								
Read	1	2	3	4	5	6	7	8	9	10	
Answer	1	2	3	4	5	6	7	8	9	10	

VS	VFO SELECT										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: VFO-A 1: VFO-B
	V	**S**	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	V	**S**	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	V	**S**	P1	;							

VX	VOX STATUS										
Set	1	2	3	4	5	6	7	8	9	10	P1 0: VOX “OFF” 1: VOX “ON”
	V	**X**	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	V	**X**	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	V	**X**	P1	;							

XT	TX CLAR										
Set	1	21	3	4	5	6	7	8	9	10	P1 0: TX CLAR “OFF” 1: TX CLAR “ON”
	X	**T**	P1	;							
Read	1	2	3	4	5	6	7	8	9	10	
	X	**T**	;								
Answer	1	2	3	4	5	6	7	8	9	10	
	X	**T**	P1	;							

Note

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